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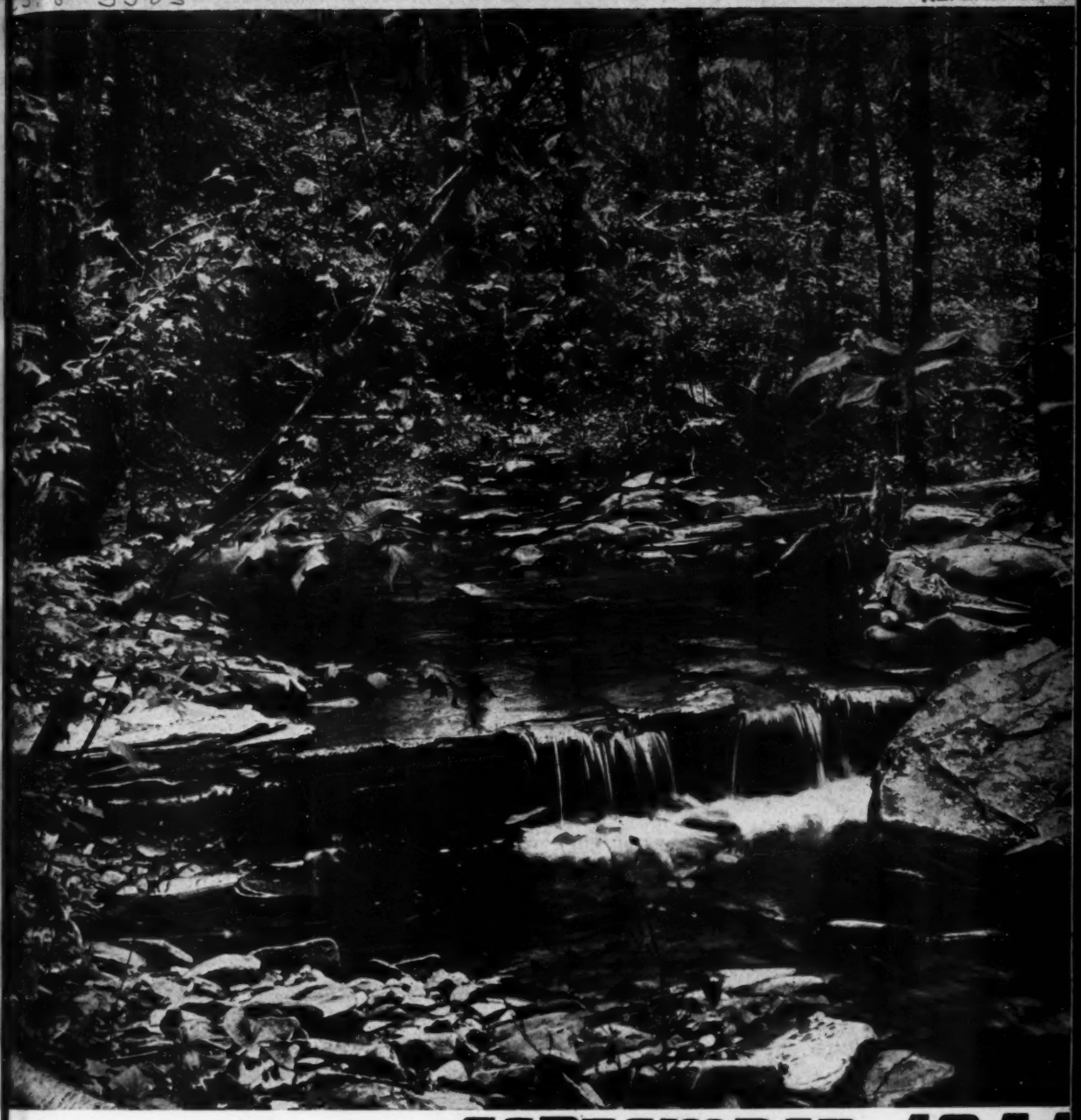

SEPTEMBER 1944

SOIL CONSERVATION

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE

SOIL CONSERVATION

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WELLINGTON BRINK EDITOR

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Front Cover: Small stream improvement dam structure on West Trout Brook, designed to cut a pool below. Photographer: G. Lowary.

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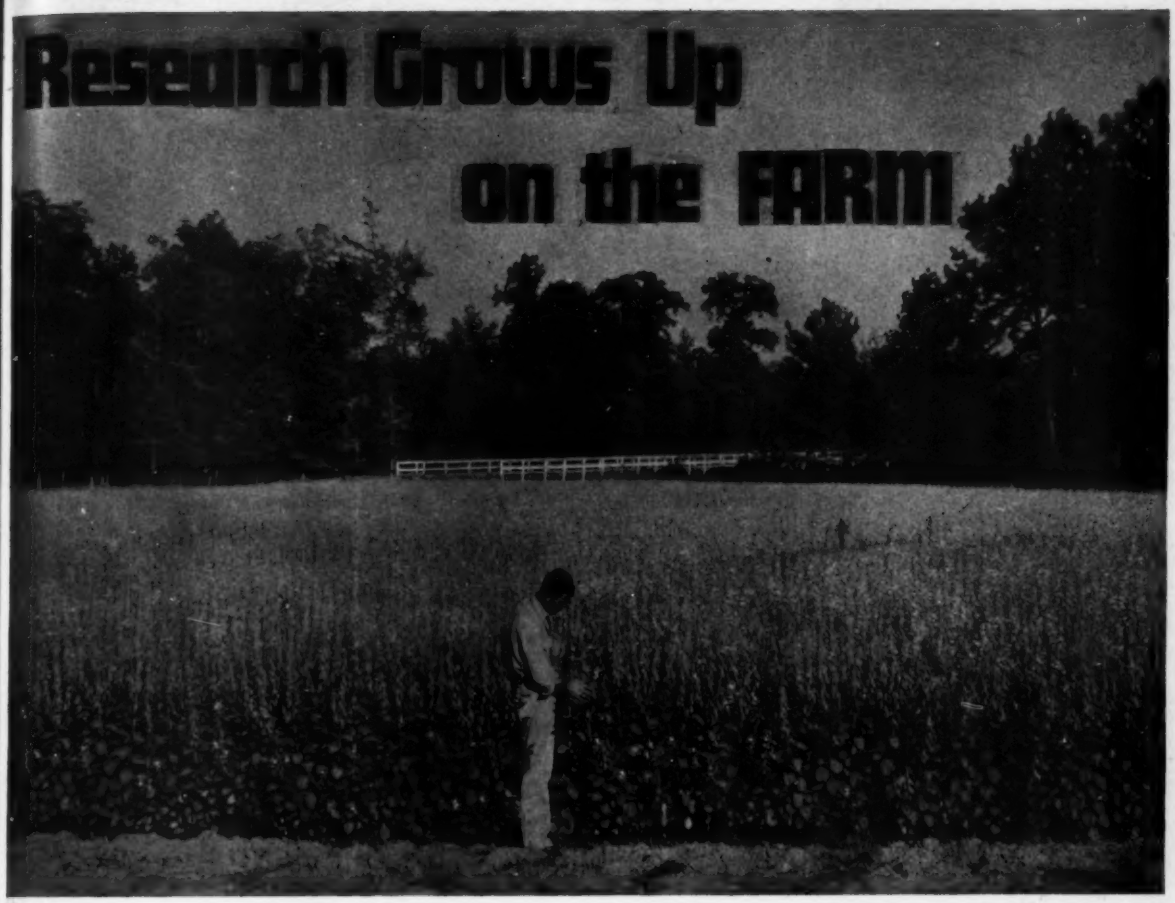
Research Grows Up on the FARM



By R. E. UHLAND

Highly unique in the scientific firmament is the research program of the Soil Conservation Service, which does not consider an experiment complete until it has moved out from the miniature plot or field to obtain maturity on the farm itself. This was true in a limited way in the early 30's, and it is even more true in these days of war's stern testing.

Soon after Pearl Harbor it was not unusual to hear the view advanced that soil conservation was "out for the duration." This strange idea, of course, sprang from the urgency of the need for immediate agricultural production as contrasted to storing for the future. The erroneous impression was widely held that increased production could be obtained only by increasing crop acreages. It failed to consider that these additional acres might be unsuited for cultivation and would, therefore, miserably disappoint.

Editor's Note.—The author is research-operations liaison officer, Soil Conservation Service, Washington, D. C.

Showing great promise for the South, this early-maturing strain of crotalaria is getting a good work-out in the Soil Conservation Service nursery at Sibley, La.

It is now well established, however, that increased production, both now and in the future, can best be had by practicing soil conservation. Early experimental data from soil conservation stations in Texas, South Carolina, Oklahoma, Missouri, Iowa, Illinois, Ohio, Wisconsin, and Washington showed the rapid rate at which soil and plant food were being lost from cropland by erosion. Studies carried out in cooperation with state experiment stations showed that with proper cropping and cultural operations, supported by needed mechanical structures, soil and water losses could be reduced to a minimum and the per acre yield of crops could be markedly bettered.

More recent data from these and more lately established experiment stations show how widespread is this soil destruction—and how the dividends fall off as the soil capital disappears. They effectively disprove the theory that the only way to add to the harvest is to add to the acreage. Con-

KUDZU: The ornamental, the trellis-climber, the "porch" vine, continues to function thus beneath the eye of the Lady of Liberty atop the Capitol dome. It is none other than kudzu that makes this shady bower overlooking the seat of National government. But out yonder, on the erosion-worn fields of the great South, kudzu is finding useful work it never dreamed of until recently.

servation farming is found to increase each acre's yield by a good 20 percent. Obviously, the application of conservation measures which increase yields and at the same time reduce soil and water losses constitutes a major contribution toward the problem of emergency — and post-emergency — food production.

So convincing were the research findings of these stations that as early as 1933 it was considered a national duty to get the erosion control measures that had proved so effective on small plots and fields into actual use on the farms themselves. Provision was made for the establishment of 10 large demonstration projects, most of them located near soil erosion experiment stations. The purpose was to show that the research findings on the station tracts could be used profitably by farmers within these projects.

From the beginning, the Soil Conservation Service freely drew on the notable work of state research centers, and on the studies of other agencies. It acquired the habit of searching through the findings of science for conservation ideas which could be given immediate test on experimental plots and later on farm fields.

As might be expected not all conservation measures of promise succeeded. Some practices that worked well in one place or on certain soil types didn't do so well on other soils at different locations. Through the simple planning and carrying out of evaluation studies and field trials on these projects, and through the extension of fundamental cooperative experiments on the station farms, the needed modifications for applying many soil conservation practices were determined.

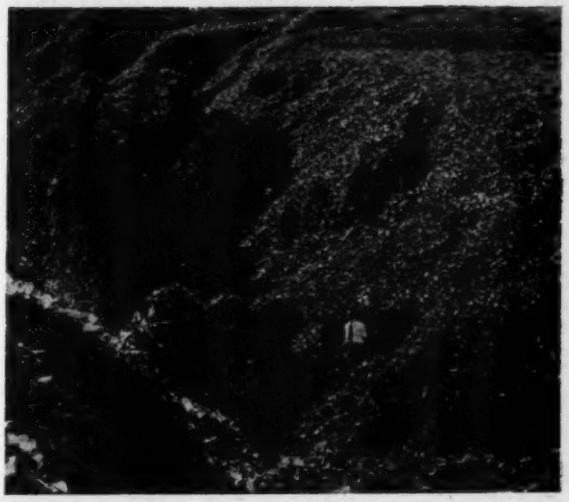
With the early extension of projects to new areas, many new problems arose. This called for a marked extension of cooperative research, and for evaluation studies and field trials. Opportunity was given to most Service personnel to get a certain amount of experience in both research investigations and in field application of research findings. The operations field technicians assisted in establishing and carrying out the evaluation work and the field trials. Thus, it has been possible continually to improve soil and water conservation practices and to hold costly mistakes to a minimum.

The action program of the Soil Conservation Service at present is centered around soil conservation districts. These districts totaled 1,114 on June 15. They are distributed in 45 States. The acreage of land within districts represents almost one-half of all the agricultural land in the United States.

In rendering service to soil conservation districts, our field technicians must rely constantly upon research information from the various experimental fields and from cooperating farms on former demonstration projects. Research, they

find to be a most valuable aid in planning and putting into effect a program of soil improvement and conservation.

It is important that Soil Conservation Service technicians, especially district conservationist and work unit leaders, be familiar with all the research dealing with soil and water conservation in or adjoining their areas. If the problems and conditions found in a particular district differ markedly from areas where information is available the district conservationist should call this to the attention of the project leader of research and the State soil conservationist.



KUDZU: Heals gullies, rebuilds soil, adds income. Experiment and farm experience have brought kudzu out of comparative idleness and given it a miracle-working task of terrific proportions.

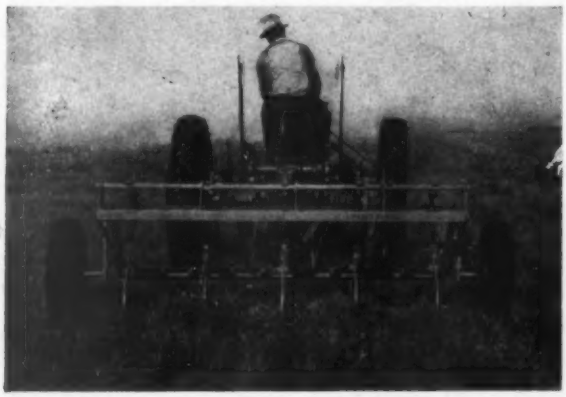
KUDZU: It supplies an abundance of high protein pasture. How those cows do love it! Northern farmers wish they had its counterpart.

Many of these problems can be solved through simple field trials on farms within the district. The operations field technicians often assist the research personnel of the Service and of the State experiment station in locating and carrying out these studies.

If it appears that more fundamental information is needed before field trials can start, the research personnel of the Soil Conservation Service and the state staff are prepared to make a thorough analysis of the problem and submit their recommendations to the Washington office. Many times it will be found that at other locations related work has been initiated and information developed which will contribute toward solution. Take, for example, the research studies on the utilization of crop residue which are being conducted in about 30 states and at several locations in each state. Obviously, conditions vary widely from place to place, and the findings must be studied for their practical application to particular points and areas. To meet special problems, it has sometimes been necessary to initiate experimental work in areas not served by established stations.

The importance of the district soil conservationist being thoroughly familiar with existing research work was illustrated recently at a typical meeting of a district governing body. All of the district supervisors were present, along with two community leaders, the district conservationist, the county agent, and a member of the state committee. In the discussion that took place at this meeting it was obvious that the district supervisors and the community leaders overlooked the fact that one of the original soil and water conservation experiment stations was located

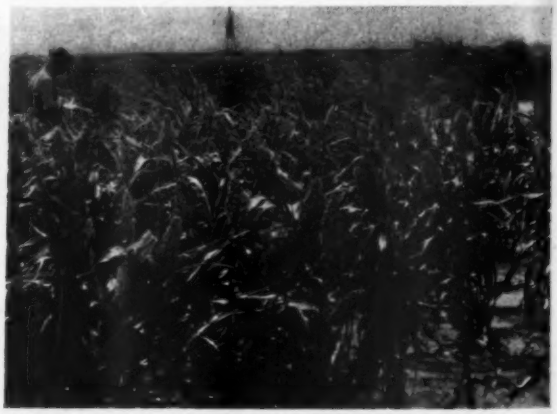
Seed strippers mounted on old automobiles have proved helpful in collecting seeds needed for the revegetation program on the Plains.



Research pioneered the subsurface tillage idea; quickly delivered it for trial in the field. This subsurface tillage machine with wing sweeps leaves much of the stubble on the surface instead of turning it under, as with the moldboard plow.

New farming methods call for new implements. Dr. Bennett gives his attention to one of the subsurface tillage machines in use by farmers in Pawnee County, Neb.

Severely hummocked field in Dust Bowl. Typical of the problem that challenged joint efforts of scientists and farmers in 1934.



Glimpse of same field, after leveling and planting to milo and sudan grass.

within the State, less than 50 miles away. The district supervisors were discussing conservation practices that had already been tried and proved on the experiment station. In addition, these same practices had also been applied on several hundred farms in the large demonstration project which included the experimental area. It is entirely possible that many similar meetings have been held, in other districts, where occasion has not been taken to advise the district committeemen and the community leaders of important research findings that might apply to their districts.

The district chairman called on the district conservationist for technical advice concerning several conservation practices. But the conservationist failed to tell about the conservation work carried out in neighboring counties. It would have been appropriate to have pointed out the significance of the results obtained over more than

The common crooked-type black locust; nothing to brag about.

10 years of experimentation and application on farms, and to have suggested the station as a logical place for the next scheduled meeting.

At the subsequent meeting the research project leader would assist the district conservationist in showing district committeemen and community leaders the experimental work at the station. Furthermore, they properly would visit some of the neighboring farms in the demonstration project where many of the mooted conservation practices have been in operation for 8 to 10 years. This would provide a splendid opportunity for committeemen and community leaders to discuss and compare their own problems with those within the demonstration project, and enable them to determine how best to proceed with the district program.

Often, district conservationists will find the answers to many of the problems in their districts spread right out before them on experiment station farms and on farms located in demonstration projects. They should take full advantage of the opportunities nearby, and thereby render a greater service to the district.

Preliminary studies made over a wide area have shown that land capabilities are influenced by depth of topsoil and that crop yields vary inversely with soil depth. These data, when considered in conjunction with relative commodity prices and farm expenses, are very important in determining the best present and future economic use of farm land.

Innumerable are the examples of the results obtained from soil conservation research. Only a few are needed to illustrate their effect on the agriculture of this country.

On the other hand, here we see a specially selected strain of straight shipmast locust of economic importance. It is rapidly replacing its vagabond cousin.

Contour cultivation, little used until a few years ago, is rapidly replacing the practice of farming up and down the hill. The Service records show that 14,171,282 acres of contour planting had been planned on soil conservation projects and districts, and 10,382,516 acres of contouring were actually to be seen by the beginning of this year. The increases in yield run from 3 to 11 bushels per acre for corn and 3 to 6 bushels per acre for soybeans in the Corn Belt. In the Southern Plains contour cultivation has given good increases in the yields of wheat, kaffir corn, and edible beans. Increases have been reported elsewhere for potatoes, vegetables and other crops.

Kudzu, which until recently was used primarily as an ornamental porch vine, is now marching across the critical slopes of the Southeast reclaiming gullied and eroded land and supplying valuable pasturage and hay. This high-powered soil conserving crop has already been planted on 174,195 acres and by the first of this year plans had been made for planting 409,421 acres in the Southeast.

The wild winter pea was just an unnoticed legume of little significance until it was taken hold of, and its worth as a soil conserving crop demonstrated, by K. G. Baker of the Alabama Agricultural Experiment Station. Crotalaria and blue lupine are additional crops that are being used extensively for soil conservation through much of the South.

The crooked black locust, so common to many sections, is being replaced (as a result of our research) by the superior straight shipmast locust which promises more economic return.

Practical ways and means of ridding range lands of mesquite, have been developed and are already being applied to ranches in the plains of Texas. The elimination of undesirable trees from range lands improves the grass very materially.

The development and use of crested wheat grass in the Northern Plains and the use of alfalfa and brome grass in the Corn Belt have contributed much in the way of conservation and in supplying valuable feed. The seeding of alfalfa, in the eastern part of the Corn Belt, on poor pasture or meadow land, without plowing, is quite a departure from the conventional way of seeding. This practice has proved practical in conserving soil and water and insuring high production when the soil is properly limed and fertilized. Application of these findings is being extended to large acreages of farmland in eastern Ohio and is under trial at a number of other locations.

Improved drainage has removed many of the hazards of farming on bottom land and has contributed much to crop production during this war emergency. Similar drainage improvement needs to be applied in many areas not now treated.

The development and use of subsurface tillage equipment for better utilizing crop residues has occupied a very important place in the soil conservation program in the Northern Plains. Much additional investigational work is under way throughout the United States which should ultimately supply the information needed for determining the best crop residue management for each problem area.

Studies conducted in the Dust Bowl furnished information on the practical procedure for stabilizing sand dunes and for getting the many blow areas revegetated.

Many questions admittedly remain unanswered. Practices now in use can and should be improved. It is heartening to have many Federal and State Agencies giving assistance to farmers in this great fight against soil wastage. Through the application of a coordinated soil conservation program valuable soil is being conserved and at the same time increased per acre yields are being secured. It is quite apparent, however, that if research and operations had not worked together in this cooperative approach to soil conservation we would undoubtedly have plowed large acreages of ill adapted land to meet the requirements of this war just as we did during the last war.

Thus, indeed, would soil and water conservation have been out "for the duration." Furthermore, it would have been set back at least another quarter of a century. This reemphasizes the need for close exchange of information and union of effort between the forces of research and those of operations in developing and establishing soil conservation practices. It is imperative that all technical Service personnel be alert to the extensive research under way in the field of conservation and closely related investigations, and that the district governing bodies and the public generally be kept informed concerning the results. By so doing, steps can be taken to modify present research so that it will meet promptly changing conditions, making it possible for the Soil Conservation Service, through organized districts, to render the highest type of service to farmers and ranchers and thereby extend the benefits of soil conservation to the entire Nation.

Mixtures of brome and alfalfa are making good for soil conservation in much of the corn belt. This is on a Kansas farm, not an experiment station plot.

Blue grama in Texas — excellent protection against both water and wind erosion.

Something new is being added — weeping love grass, a highly productive grass which protects the land against erosion.

Spuds, too, are beneficiaries of the teamwork of experiment and experience. Contoured Maine potatoes here are being sprayed with specially designed equipment to get at both under and upper sides of leaves. In the background is a neighboring field still clinging to up-and-down cultivation.

Crested wheat grass is rapidly taking vast acreages in the West, backed by sound research and extensive tests under actual farm conditions.

Sweet clover has proved itself a high-powered legume which responds well to treatment and is making good in a big way as a soil conservationist.

1944 OHIO CONFERENCE

By WELLINGTON BRINK

THE SCENE is Camp Muskingum, nerve center of the famed Muskingum Watershed Conservancy District, where floods are harnessed, and watersheds returned to crops and wildlife and woodland. The year is 1944. The occasion is the third annual conference on conservation, nutrition and human health, held as a part of Ohio's unique Conservation Laboratory for Teachers.

Tar Hollow pioneered the laboratory and the conference. Tar Hollow attracted such popularity that it became necessary to transfer headquarters to the better equipped and more commodious Muskingum.

You have heard about the experiment at Tar Hollow. In October 1942, and again in October 1943, the story was told in the pages of this magazine.

The idea is to provide teachers with a six-weeks combination vacation and Nature-study course. The method and the scope are the unique features. And the extraordinary thing is that it had never been done before. To learn Nature, the teacher-students live with Nature. So do the geologists, biologists, soils scientists and other members of the faculty. In the presence of Nature, latent interests are whetted, dead book knowledge comes to life, life relationships fall into their appointed pattern.

Camp Muskingum.

Photographs by Orval E. Sellers, supervisor of visual aids, Board of Education, Akron.

You don't go to Tar Hollow—or Muskingum—to study mineralogy. You don't go there to concentrate on the cell formations of grasses and woody plants. You don't attend for the purpose of acquiring a degree in mammalogy. What you do seek is a coherent understanding of the soil and the life it supports. For once in your life, at least, you put to examination a segment of Man's primeval environment, see what happens when you apply the principle of ecological adjustment. What of Man in his natural world of wind and wave, rock and vegetation, fur and fin and feather? How must he behave in the presence of life's elements if he would have them all his friends and helpers?

It is science, of course. It is indeed a senior science, into which must enter nearly every other major science. The ecology of plants and animals, in many schools of Ohio and in a few schools in other states, is being recognized as a fundamental part of a good curriculum. Small children, and their older brothers and sisters, are finding vitality and fascination in this new science missing heretofore. And the courses themselves, with few exceptions, remain unchanged—it is the philosophy and the teaching that tells. The teacher of eco-

logical mind now talks not merely soils—he talks soils and their conservation. The teacher of botany broadens his subject to point out vitamin and mineral content. The vitamins and minerals, in turn, are coupled with farming methods—and farming methods are linked to the social and economic coloration of the community.

Ohio's state university and conservation forces sponsor the Muskingum outdoor laboratory, provide credits which may be applied for degrees, set a precedent of breaking away from orthodoxy in educational methods.

As a result, there has been more than a ripple among the pedants. Students have come from many parts of Ohio, and from many other States.

The country is taking note. Year by year, the list of leading lecturers and public leaders who gather for a two-day conference on conservation, nutrition and human health becomes more impressive. The conference is a high spot—but only a high spot—in the regular sessions of the school. It is also a high spot, and a growing influence, in the country-wide drive to rationalize the conservation of soil and of the American civilization which rests thereon.

FROM KNOX COUNTY, Ohio, this year came Cosmos D. Blubaugh to tell a story, "How We Rebuilt Our Farm." No advanced degrees go after his name. No gift of gab has he. A slight man, just a little shy, Cosmos Blubaugh was a principal speaker on a program of undoubted distinction. His only title is a common one, and yet it carries uncommon dignity and authority: farmer.

Farmer Blubaugh, whose story was briefed in SOIL CONSERVATION back in May 1940, didn't climb to the center of a platform—but a platform came to him. He spoke quietly, somewhat hesitantly at first, but as he continued to speak the eloquence of simplicity tipped his tongue and the power of great truth lighted his kindly eyes. And when he was through, the beams bracing the roof of Muskingum's great lodge felt the vibration of applause from the audience in the folding chairs and from the expectant, hopeful, larger audience waiting for his message to feel its way across the land.

Farmer Blubaugh bought an erosion-ravaged, worn-out hill farm in 1924. . . . "Men who enjoy the feel of the earth under their feet will know why I wanted to farm." . . . Forty bushels was all that he could get the first year from 15 acres in a field planted to wheat. Half of that belonged to others. There was not enough grass on 140 acres to pasture 3 not-too-hungry cows. . . . "There was absolutely no humus—the soil was low on everything."

But Farmer Blubaugh had an ace or two in the hole. They stemmed from common sense and native shrewdness. He practiced thrift, carefully husbanded every bit of barnyard manure and distributed it on a new seeding of wheat, not for the purpose of growing wheat but to grow grass. From the Extension Service he learned that he should add lime and phosphate to his land. From his bank he obtained the trifling bit of credit needed to prepare a 4-acre field by way of a beginning. From "generous" neighbors he obtained their unused straw and stalks. As a result, Blubaugh obtained the best wheat yield that the land had produced in 20 years, 15 bushels per acre.

But it took Farmer Blubaugh around 10 years to really get going. That was when the Soil Conservation Service came around a bend in the road. It brought a CCC Camp to the neighborhood—husky, intelligent lads under expert supervision, who laid out strips and relocated fences on the Blubaugh place and gave the little extra push needed to get a soil conservation plan under way.

Blubaugh stopped the washing of soil, pinned it down with vegetation. He centered his attention on grass. He left on his field every possible scrap of residue, to protect the oncoming crop—

AN EARTH AT PEACE WITH ITSELF

Fair is the land that rims the Tuscarawas, the Conotton, and the McGuire. Quiet, cool, are the dawdling streams. Green, happy, are the cradling slopes. Gentle is the rule of order and discipline. A canoe slices like a whisper across a shaded pool, and a drinking doe mothers her fawn to the protective cover of the brush. Nature smiles the old-young smile of memory and hope.

Here, where calm waters pile back in a twelve-mile lake from the breast of a man-made dam, a new faith stands to cheer the rising sun. A noble and intelligent faith that moves within a widely-drawn periphery. Here, vigorous and clean as morning dew—and as welcome to the aging throat of civilization—lies upon every leaf and stem a concept of an Earth at peace with itself. Here Science and Youth move in comradeship with that which is on, and of, the soil.

—WELLINGTON BRINK

all straw except for bedding, corn fodder hauled in from the farms of neighbors who were glad to get rid of it. From a big sheller in the neighborhood he hauled 3,000 to 5,000 bushels of corn cobs which would otherwise have gone to waste. Year after year, Farmer Blubaugh "grew grass to feed trees." Year after year he built his soil from "waste" vegetation. Year after year, he pumped nitrogen into his gasping acres with legumes. He found that his alfalfa thrived on a phosphate fertilizer, used no potash. Some of his neighbors thought they needed "complete" fertilizer, but Blubaugh preferred to grow most of his.

Gradually, steadily, the old farm came to life. Gradually, steadily, it changed from an old farm to a new farm. "Grow grass, and you can grow anything," Blubaugh began to say.

But Blubaugh is a successful conservation farmer partly because he is a successful conservation father. He has kept his soils on his farm, and he has also kept his sons on his farm! Those two sons he took into partnership. One of them manages the orchard, one of them the dairy and hybrid seed work. But it is a flexible arrangement which permits either to be gone a week at a stretch, knowing that his brother is entirely competent to carry on. The soil is happy, and so are the sons. They all work together, whistling at their work.

Today, the Blubaughs produce 20 to 40 bushels of wheat per acre, from 85 to 100 bushels of corn, from 3 to 4 tons of alfalfa; the business harvests 8,000 bushels of tree fruits and 2,000 bushels of berries each season. Twenty acres are in hybrid seed corn—800 certified bushels is the yield, at a profit of $5 per bushel. Thirty acres are in feed corn. The pasture takes care of 1 or 2 animal units per acre; in the summer Blubaugh takes his cows off bluegrass and puts them on alfalfa, and he doesn't bother much with adding protein feed. Today, 140 acres are supporting three families and from one to twenty hired helpers. Blubaugh figures every department a money-maker, keeps careful books, estimates an increase of 5 to 15 bushels per acre in corn yield from the simple fact of leaving the stalks on the field for reincorporation with the soil. He gets 5 to 6 bushels more wheat per acre by cutting with a combine rather than a binder. He knows that the straw definitely increases the growth of grass; it is more lush, and it comes earlier in the spring. He is sold on contour strips 70 to 85 feet in width. He rotates 2 years grain with 2, 3 or even up to 5 years grass. He has 1,085 apple trees, 350 peach trees—all feeding, and thriving, on "unwanted" vegetative matter. And he admits, despite all the current furore which centers in his home State on the subject of plowing, "I use a moldboard plow!"

Some of Farmer Blubaugh's neighbors have been picking up some good tips. (It took them 19 years to start!) As a result, they have lately been tripling grass and grain yields and are beginning to complain, "What shall we do with all this grass?" Blubaugh doesn't worry on that score.

Not only has the soil come back—so has the water. Back in 1924 Blubaugh had three feeble springs. His cows would take the supply at a gulp or two, and then have to wait 8 to 10 hours for another supply. Today the springs are back in full flow.

Blubaugh drilled a well. He used a hand pump at first, and could pump the well dry in 15 minutes. Today an electric centrifugal pump provides 5 gallons a minute, 24 hours a day.

Blubaugh built a dam, sodded the spillway, installed a fence, turned water in on Decoration Day two years ago, now has a spring-fed pond 1¼ acre in surface size, 8 feet deep. To hold down the bluegill population, he has stocked the pond with large-mouth bass which will provide good food and good sport. Next year he plans to fertilize the pond in accord with the best modern practice.

That's all there is to it, says Blubaugh. A simple story, simply told, but one which had the Muskingum conference excitedly asking questions for 30 minutes after Blubaugh arrived at a convenient period.

SPOKE then the brilliant author and economist, Ralph Borsodi. From his own sustenance plot near Suffern, N. Y., he brought a crisply stated "Plan for Rural Life."

Dr. Borsodi is a pessimist, and a dreamer. But his pessimism and his dreams are agile with restless hopes and plans and ideals. And they move with the sincerity of personal experience. He grows his own food, weaves his own cloth, with his wife turns back the years toward the rural self-sufficiency of the pioneering forebears. Behind Cosmos Blubaugh, maintains Dr. Borsodi, is a century of miseducation. And again, "The greatest crops Mr. Blubaugh raised on his farm might not be the crops but the children"—for Dr. Borsodi does not regard farming as a business but as "a way of life."

Ralph Borsodi was born in New York City. He became an expert on marketing, a consultant to big industry. Out of his contacts with hard pavements, out of the groaning of factories, out of the contacts with moneyed business and congested

The land under close scrutiny by a Conservation Laboratory class. Dr. C. L. Dow, teacher.

populations, came fierce revulsion that drove him in determined flight to fields and streams. Here, as he labored to supply his simple living, he took time to think.

From his thinking came the conclusion that it is a mistake to regard this world as containing two kinds of human beings, two kinds of cultures, two kinds of economic conditions. We—they—are all one. Something he reasoned, must be terribly wrong with modern industry, sociology and plans for living.

He recalled the warring philosophies of the founding fathers. "One dream," says he, "is symbolized in the person of Thomas Jefferson, who believed that the only way the new Nation could be built and maintained was as a rural society, who believed that if ever America forgot that, the country was doomed. "The other dream," Borsodi says, "was symbolized in the figure of Alexander Hamilton, who hoped for a manufacturing society, with the rural population feeding cheap raw materials into industry. We have given lip service to Jefferson. We have actually followed Hamilton."

Dr. Borsodi is deep in sorrow, passionate in denunciation. "I believe society is very sick," says he. "I wish I had the eloquence to tell you how sick it is. What is wrong? Why is it we have a society which every ten years or so throws an apoplectic fit which we call a financial crisis? . . .

"We adopted a fundamentally wrong attitude toward the land. What we really used the land for was a gigantic real estate speculation. We purchased it cheap, used it for a time, moved on to cheaper land. We look at it, on the one hand, as 'the holy earth'—and on the other, as a means of making money. Roughly, every 30 years the farmers have had to ship their holdings to the city heirs—the full value of the investment in their farms. . . . Why divide America up into 160-acre blocks, utterly disregarding the topography of Nature? . . . From the very beginning we have assumed that the object of every rural family is to make money. This accounts for cash crops, specialized cropping, the concentration on tobacco, cotton, furs. . . . We have over-mechanized. Every time you double the size of a farm, you push somebody off the land."

Dr. Borsodi foresees another—and better—pattern, which involves the repudiation of all

these things. He foresees a return to small farms —everyone on a plot of ground, and a plot of ground for everyone. He foresees the breaking up of heavy industry and in its place small, decentralized industries manned by workers who have one foot in the soil. He foresees a decline of the dollar motive, and a truer perspective drawn on farming as "a way of life." He suggests that each farm should constitute "a balanced biological unit" similar to that of a Virginia friend of his which supported 35 persons, produced 90 different items.

Replanning of rural communities is indicated, he says. And the least we can do for returning soldiers is to make it easy for every one of them to acquire a piece of the land for which he fought.

The pink glow fomented by the success story of Blubaugh and the utopianism of Borsodi still warmed the rank and file of conferees hours later when a calm logician rose to discuss the building of a permanent agriculture.

THE CALM LOGICIAN was Chester C. Davis. He is as factual as he is friendly. Out of long and intimate knowledge of both farming and business, Chester Davis has learned to accept the broad outlines of the established American social order. Within those outlines he finds room to reconcile disruptive lights and shadows. He views the panel with the open mind of the journalist, the exactitude of the financier, the perspective of the government administrator. Once a distinguished editor, later the courageous and imaginative head of the Agricultural Adjustment Administration, currently the president of the Federal Reserve Bank of St. Louis, Chester Davis is now also president of Friends of the Land—and there is no truer "friend" anywhere.

Mr. Davis hopes for an agriculture not only permanent but also satisfactory both to the farmer and to the whole American family. Frankly, he warns that we are not to realize the agriculture of the perfectionist. "And yet," says he, "always men have dreamed dreams—and sometimes rapidly, sometimes gradually, we see those dreams take hold." As a result, we have waxed great and prosperous, with a National income of around 150 billion dollars a year—and a National debt of 90 billion dollars, to which is being added a billion dollars more each week.

"The question," the speaker bluntly puts it, "is, how well can man master the machinery he has developed?"

Wise counsel: Farm debt has been reduced; farm income increased, and for the most part used intelligently. Agriculture must face serious readjustments after the war . . . Let's keep out of debt . . . Let's hope that farmers will sock every cent they have into war savings bonds and not go on a buying spree for new land. . . . Let's continue to underwrite farm prices during the period of adjustment . . . Avoid basic elements of a land boom . . . Extend grassland, make the conservation of soil and water the basis of farm operations.

Then—a sober word of caution—we shall have to do everything possible to prevent an unwise rush back to the land. "Those who watched after the last war—those of us who know something of the pain and size of the agricultural situation—fear the impact on established farmers if an attempt is made to make agriculture the shock-absorber of the industrial workers who come back."

Chester Davis well knows that leadership and statesmanship will be required. He urges the development of healthy terms of land tenancy, the necessity of keeping the farm income high and working for its wide and careful distribution. He stresses the importance of finding full employment for workers in non-agricultural fields, at good wages, as a requisite to sound rural life. "I would like to see the factories going full blast, turning out useful goods—everything needed on the farms, at the best prices. Do that, and we need not worry about farm prices; they will be somewhere near parity. It is all one problem; many men see this, some of them high in the ranks of industry."

The way to effect a speedy transformation back to peacetime pursuits, if we would heed Chester Davis, involves maximum output, lower unit costs of production, wider distribution of goods, gradually lowering prices, sincerity, good humor, tolerance, cooperation, and organization. A stiff menu, but full of digestible vitamins for a Nation convalescing from war.

FROM WASHINGTON this year came Dr. William R. Van Dersal, to tell of the use and abuse of the American land. Author of the soundest, most complete and most readable book in existence on ornamental shrubs, Dr. Van Dersal has a "green thumb" and a feeling for the soil that comes of working in it with a trowel. But Dr. Van Dersal also has the long perspective that shows in his currently celebrated "The American Land—Its History and Its Uses."

Very artfully Dr. Van Dersal set the stage for the entire sessions. In some 45 minutes he compacted the genesis of agriculture from Adam to AAA. He advanced the theory that "we did not *will* a democracy in the United States; we could not help it!" And again, he reminded us that in the early days of settlement of this country we had to "learn not only how to live with each other but how to live on the land that supports us." After tracing the troubles of the land, he declared, "If American land and the abundance of it induced the development of a democracy, it is of historic significance that democracy may prove to be the salvation of the land. Never before in this country or in any other country has such a coordinated attack been made on the land problems of a Nation. In this respect the United States is far ahead of all other nations with the possible exception of Switzerland . . ."

DR. WILLIAM A. ALBRECHT is a perennial, a fixture of the conference. More than any other man, in all likelihood, he has set the Nation to thinking about nutrition in terms of soils. He is chairman of the Department of Soils, University of Missouri, but his time and energies are claimed increasingly all over the United States, where he lectures in the dual capacity of scientist and evangelist. He said, as always, many striking and memorable things. H. E. Hamlin, supervisor of health and narcotics of the Ohio Department of Education, neatly gathered the gist of Dr. Albrecht's remarks in the following five-point summary: As a Nation we wrongly tend to 1. emphasize economics in contrast to agronomics; 2. rely upon photo-synthesis rather than bio-synthesis; 3. feed upon carbonaceous rather than proteinaceous foods; 4. depend upon "go" foods rather than "grow" foods; 5. go from a temperate people to an intemperate people by a simple act of processing the "go" foods.

ON 1944's PROGRAM, too, were David C. Warner, of the Ohio Department of Public Works; Professor Clyde Jones, of the State University's botany department; Arthur R. Harper, naturalist of the laboratory staff; Dr. Julian D. Boyd, of Children's Hospital, University of Iowa; George Trautman and Don Waters, of Ohio's Division of Conservation and Natural Resources. Each made a valuable contribution to the warp and woof of conference thought.

I should like to present in full the remarks of Ollie E. Fink, who so ably directs the entire school; Dr. Jonathan Forman, who always has a guiding hand in the rigging of the featured conference; Dr. Paul B. Sears, esteemed for his counsel and leadership. But the readers of SOIL CONSERVATION already are well acquainted with the works and writings of this notable conservation team and will, it is hoped, become yet better acquainted as future issues roll off the press.

In touching on the high spots of the conference, it is well to remember that the dormitory debates and the group discussions at meal-time and smoke-time are equally stimulative. The only way to derive the full benefit of the annual conference is to attend; no second-hand report can adequately substitute. My advice to would-be keepers of the soil is to put this annual meeting on the "must" list for next year. For the Tar Hollow—excuse me, the Muskingum—conference is now a regular institution, draped in its own tradition, coloration, and unique appeal.

To the Muskingum outdoor conservation laboratory are being drawn students from many states. They came not only from Ohio this year, but also from Tennessee, Illinois, Connecticut, Indiana, Minnesota, New York, Michigan, and New Hampshire.

BOND PURCHASES SOAR

Nearly 1½ million dollars were invested in war bonds by employees of the Soil Conservation Service from March 1 to August 1 —$1,472,605.24, to be exact. This proud total represents payroll allotments plus cash sales during the Fifth War Loan drive.

Within the period of the Fifth War Loan campaign, Service employees attained 121.52 per cent of the assigned quota of purchases.

Cash purchases by Service employees within two months, June and July added up to $395,630.70. Payroll allotments for bond purchases accounted, within these same 60 days, for $418,796.68.

While all of these purchases were voluntary, it is apparent that workers in the agency primarily concerned with the salvation of the soil resource are equally determined to conserve all the other values important to the future of the United States.

John S. Fickling is chairman of the committee which handles war bond purchases in the Service.

The Wadsworth Brothers, a Conservation Team

By BARRINGTON KING

When the three Wadsworth Brothers of Autauga County, Ala., started farming on their own 10 years ago, they didn't start from scratch. They started way over on the minus side of the line, for the farm they inherited from their father was heavily mortgaged, the equipment was in bad condition, the workstock was old, and the land itself was tired.

Like most farmers in that section, their father had always been a cotton farmer. He planted 300 to 400 acres to cotton each year. The time was when a farmer that planted that much cotton could go to the bank and borrow all the money he needed to operate his farm. When cotton prices were high, farmers in the big cotton plantations lived exceedingly well.

But a one-crop system of farming without adequate soil conservation measures had greatly reduced the productive capacity of the land. Cotton yields had consistently declined. It was becoming more and more difficult to meet the farm's obligations. When the depression came and the price of cotton dropped below the cost of production, the outlook was grim indeed.

After the death of their father, the Wadsworth Brothers realized that even to pull the farm out of the red was going to take years of hard work, frugal living, and an improved system of farming that would provide new sources of income. Close cooperation would be needed to put the farm on a business-like basis.

The three brothers started out in 1934 by borrowing $700 to buy a little livestock, equipment, seed, and fertilizer. They began their first year's operations with 11 old mules, 7 or 8 cows, a brood sow or two, and a strong determination to build up the farm to a high state of productivity.

To cut their living expenses to a minimum, they decided to maintain only a single household. The three brothers, their wives and their children all live in the family home with their mother and have a joint account at the bank. They hope eventually to build separate homes, but those can wait until other plans materialize.

To get on an efficient operating basis, they decided to divide the farming operations. Jack, the oldest brother, became general manager, responsible for financing the farm and handling the machinery. Leonard was to look after the labor, with supervision over hoe hands and plowboys, and responsible for production of row crops. Edward was given charge of the livestock.

While each had his special field, they all pooled their efforts during rush seasons at planting and harvest time, or on occasions like the one this spring when the three brothers played midwife to 50 brood sows for three nights during the spring farrowing seasons. But that's getting ahead of the story.

Back in the those early days the Wadsworth's

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Harvesting seed from 75 acres of first-year white Dutch clover, which provided grazing for 86 cows and their calves from February 15 to May 1, when the cattle were removed to allow the maturing of a seed crop. This picture was made early in June.

Cultivating cotton on the contour on the Wadsworth Brothers farm in the Central Alabama soil conservation district. Cotton acreage has been reduced from the 300 to 400 acres formerly planted, to 100 acres under the conservation program.

Chief Bennett of Soil Conservation Service, Edward Wadsworth, and Novelist Louis Bromfield look over hogs on Wadsworth farm during Friends of the Land tour.

realized that they would have to take advantage of all the help they could get if they were to make a success of their venture. Triple-A assistance went a long way toward enabling them to develop pastures and hay for the increasing numbers of livestock on their farm, and the TVA furnished phosphate for improvement of demonstration pastures. In addition to this material aid, they have consistently obtained information from the Extension Service and other agencies.

When the Central Alabama soil conservation district was organized in 1939, the Wadsworth brothers were among the early cooperators. Through the district, they obtained aid of the Soil Conservation Service in working out a sound land use program that put every acre on the farm to its most effective use. Under the complete soil conservation plan that was developed they made rapid progress toward the accomplishment of their goal of improved soil fertility and livestock farming.

As a part of their conservation program for the 3,000 acres they operate as a farm unit, the Wadsworth Brothers have established 150 acres of kudzu and 50 acres of sericea on their poorest, most erodible land. These areas would not make over 5 to 10 bushels of corn per acre, but they produce good yields of high-quality hay and provide abundant grazing for hogs.

During the past 10 years, the three brothers have developed 500 acres of permanent pasture. About 100 acres of land are prepared each year and fallowed during the summer. This permits taking advantage of favorable moisture conditions for early planting of winter grazing crops.

The Wadsworth brothers carry 40 to 50 brood sows and get two litters of pigs a year, averaging 7 to 8 pigs to the litter. Most of the pigs are farrowed during periods of a week or 10 days in March and October. They are farrowed on crimson clover in the spring and kudzu in the fall, which has largely eliminated the occurrence of diseases and parasites.

The litters farrowed on crimson clover in the spring go to kudzu in the summer and are finished on corn in August. Those farrowed on kudzu in the fall are pastured on oats until about February 1, when they go on crimson clover. They are sold as tops in May and September, averaging around 250 pounds.

Cows are bred for calves to come in the winter. The calves are fed out for baby beef by fall, when they weigh around 500 pounds. Last year the Wadsworth Brothers sold 600 hogs, 200 baby beeves, and 50 grown cattle.

The 700 acres in cultivation include 175 acres of oats, 300 acres of corn, 100 acres of cotton, 50 acres of sorghum for silage, 50 acres of sweet potatoes, and 75 acres of crimson clover for hog grazing. During the winter, 80 percent of the cultivated land is in grain, crimson clover, vetch, or some other winter cover.

As a result of better land use, the planting of winter legumes, and the application of lime and fertilizer, crop yields have been increased materially. Cotton production has been boosted from 300 to 400 pounds per acre, and the yield of oats from 25 to 30 bushels to 50 or 60 bushels per acre. Field selection of seed corn and good farming practices have increased corn yields from 10 to 15 bushels per acre to 40 bushels per acre.

After feeding all workstock, cattle, and poultry last year, the Wadsworth brothers sold 2,000 bushels of oats and 1,000 bushels of corn.

In addition to other crops, they have 70 acres in pecans. The pecan orchard is under a winter cover of wild winter peas.

Approximately half the farm, or about 1,500 acres, is in woods. There is a small sawmill on the farm, and timber is cut for farm building and repairs by selective methods. By following good woodland management practices, an excellent stand of timber is developing. Eventually, the Wadsworths expect to cut the timber for building separate homes from their own woodland.

The three families living together in the same household—an economy adopted through necessity when farming operations were started 10 years ago—has been a factor in the successful operation of the farm. When the men and their wives gather around the same table at mealtime they have an opportunity for planning the various phases of their work together. And farming on the scale of the Wadsworth farm takes a lot of planning.

Something of the extent of the accomplishments on this farm is indicated by the fact that annual sales of beef and pork run around $40,000. Instead of the $700 borrowed to start the first year's operations, the farm's expenses now amount to $15,000 to $20,000 a year for labor, fertilizer, and fuel for farm equipment. But no longer is it necessary to borrow money to operate.

When Raindrops Splash

Moisture in flight! Long, vertical lines are falling raindrops; other flying particles, raindrop splashes.

By W. D. ELLISON

When falling raindrops strike a bare soil, or thin films of water covering it, particles of clay, silt, and sand, and bits of fine gravel and small aggregates may be splashed into the air. Many of the splashes are composed of soil particles surrounded by a film of water. Under intense lighting they appear as rockets describing parabolic curves through the air. Some of the stones and aggregates too large to be splashed by the raindrops are thumped about on the surface in such a way that their motions resemble Mexican jumping beans. This erosional activity may be

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referred to as raindrop erosion or splash erosion. It is accelerated by the formation of a connecting film of water between the clods or aggregates. Surface water a half-inch deep seems to cause more splash erosion than occurs on dry soil.

It is not difficult to imagine what flowing surface water would do while all this soil is in motion. Splashed materials, upon returning to the surface water would be held in temporary suspension by the surface flow and transported some distance down slope before they could settle out. Larger particles which are only tumbled about on the surface would also be placed in temporary suspension immediately following each thump by a raindrop, in which state they could be floated, dragged, or rolled downhill. This is one way in which raindrops and surface flow "team up" to erode and carry soil off the fields. By working together they remove much of the topsoil material from smooth surfaces on the slopes above the rills and gullies which neither surface flow nor raindrop splash acting alone would have the power to carry.

The November, 1939, issue of SOIL CONSERVATION carried some pictures and a short article under the caption "A Camera Stops a Moving Object" by J. Otis Laws. These related to studies of raindrops. Following publication of this article and several of Mr. Laws' technical reports, various experiments were started at Coshocton, Ohio, which used Mr. Laws' results to determine raindrop velocities. The objective of the Coshocton work was to study the effects of different raindrop velocities, drop sizes, and rainfall intensities on the splash erosion described above.

Water and soil in the three tubes represent, from left to right, samples of raindrop splash we may expect from fields where soil is well protected, where it is partially protected by growing crops, and where it is utterly bare. The author is scraping soil from a splash plate.

Above, a crumbly soil capable of filtering water at more than 6 inches per hour. No splash erosion occurred when raindrops at zero velocity were released; infiltration continued for one hour; clods and aggregates were not broken down appreciably. Raindrops at a velocity of 10 feet per second, however, caused considerable splash erosion; infiltration rate decreased and was less than one-tenth inch per hour at end of one hour. This one hour of rainfall broke down clods and aggregates and "sealed" the surface as shown below.

We may think of erosion as embracing two distinct processes: (1) displacing or tearing the soil loose, and (2) transporting the soil materials. Through these processes soils may be carried entirely off of a watershed, or they may only be shifted about over the surface in processes of erosional activity. If soils are carried from the watershed, a certain amount of soil loss can be measured but this will not necessarily be proportional to the sum of all erosional damages. Damages caused by splash erosion and which are in addition to soil loss, include development of "spotty" fields through burying topsoil under subsoil, carrying topsoil away from spots where it is already thin and depositing it where the soil is already thick, and destroying soil structure. On soil surfaces outside of the gullies and channels, these damages are dependent on splash erosion.

Although greatest amounts of erosion may be expected where raindrops and surface flow work together, either the raindrops or the surface flow acting alone may displace soil and transport it down slope. The raindrops cause soil to be transported through splash processes, while surface flow carries it in suspension or drags or rolls it along the surface. Erosion scars left at points where the soil is displaced by these two forces usually differ. Raindrop splash usually displaces "sheets" of soil, while displacement by surface flow usually forms rills which later develop into larger channels or gullies. These facts lead one to believe that control of splash erosion will prevent most of the erosional damages outside the rills and gullies, while control of surface flow will prevent damages within the rills and gullies.

Soil under these two cover crops will not be greatly damaged by splash erosion. Coshocton's experimental results suggest that low-growing plants are much more effective than tall plants such as corn, in checking splash erosion. The splash erosion caused by drips from leaves of plants increases greatly with each minor increase in height of plants.

To reduce raindrop erosion one must check velocity at which raindrops are delivered to the soil surface and this may be done with leaf canopies of cover crops and with mulches. To control gully erosion one may use flow diversions which reduce or direct and control the surface velocities. Stems of growing plants and other obstructions which impede surface flow may also be effective. It is possible to have effective control of flowing surface water and at the same time suffer high rates of raindrop splash. And, it is possible to have effective control of raindrop splash while at the same time suffering considerable gully erosion.

The different conservation farming practices used on the fields may have quite different effects on soil erosion. In our analysis of these practices we must consider their effects on both the forces causing erosion, and the erodibility of the soil. For example, leaf canopies of the growing crops and mulches tend to reduce only the forces causing splash erosion, while impediments to surface flow tend to reduce only the forces of runoff. And when it comes to the erodibility of the soil, those practices which develop stable clods and aggregates and which best develop and maintain extensive root systems to resist soil displacement are most effective in binding the soil and strengthening its resistance to erosive forces.

In the Coshocton experiments the splash erosion caused by raindrops was sampled by using splash interceptors which were described in the February, 1944, issue of *Agricultural Engineering*. The soil caught by these samplers was weighed and aggregate and particle size determinations were made. The rainfall applicator used was described in the June, 1944, issue of *Agricultural Engineering*. With this apparatus it was possible to control drop size, drop velocity, and rainfall intensity, and to vary these factors one at a time. They were controlled as independent variables throughout a series of planned experiments and the effects of each on splash erosion were studied. Results of these studies were reported in the April and May, 1944, issues of *Agricultural Engineering*. The best relationship for expressing effects of the rainfall variables on quantities of soil carried by the splash w found to be,

$$E = 0.00007661\ V^{4.33}\ d^{1.07}\ I^{.65}$$ where

E=total grams of soil intercepted by the samplers during a 30-minute period of rainfall,

V=velocity of raindrops in ft. per second,

d=diameter of raindrops in mm., and

I=intensity of rainfall in inches per hour.

No rills or gullies were developed on these experimental plots and it was evident that little or no tearing loose of the soil was caused by the surface flow. The principal work done by the flow was in carrying off the materials torn loose and splashed into suspension by the raindrops. Under these conditions there was close correspondence between the curves showing rates of raindrop erosion and those showing rates of soil loss carried by the runoff.

It was previously stated that the splash of raindrops, in addition to charging the surface water with soil materials, may also transport soil downhill. On a plot of 10 percent slope the samples collected from 59 experiments showed that 3.1 times more soil was moved down slope

than was moved up. Did you ever see a stick of dynamite explode on a hillside? Most of the debris thrown into the air moves in downhill directions and that which is thrown down slope travels greater horizontal distances than the material thrown up slope. Raindrop "explosions" work in a similar way and by resplashing the soil many times considerable soil may be moved down slope. Results of this action may be especially noticeable on convex slopes where the splash moving in three or four quadrants is traveling downhill. Wind may increase the transportation capacity of the splash by increasing velocities of raindrops, by changing the angle of the incidence, and by carrying the splash along the surface as it would carry drifting snow.

It would be interesting to know how much soil may be displaced by raindrops. The work at Coshocton did not provide a positive answer, but one may make an estimate. The photographs show that 8.25 inches of artificial rainfall caused about 1 inch of soil to be eroded and splashed away. To carry this thought further, 1 inch of this artificial rainfall would displace approximately 0.12 inch of soil. The drop velocities which caused the erosion shown in the photographs were only about 19 feet per second. If the formula showing velocity relationships is reasonably accurate (it was not tested for velocities greater than 19.2 feet per second), velocities of about 35 feet per second would increase the erosive action by about 10 times. *This would indicate that in a similar storm, but with drop velocities of about 35 feet per second, 1 inch of rainfall may splash about 170 tons of soil per acre.* One should not infer from this estimate that raindrop erosion may cause 170 tons of soil to be lost from each acre of land. The soil loss would depend on how many times soil materials are re-splashed before being carried away. On gentle slopes where there is very little transportation either by the splash or by the surface flow, some of the soil may be re-splashed many times before being carried off the watershed. Under these conditions the 170 tons lifted by the splash may represent less than 10 tons of soil re-splashed many times.

Aside from the many damages which may result from raindrop splash which displaces and shifts the surface soils, the impact of raindrops will destroy soil structure through two separate actions. These actions include: (1) breaking down of clods and soil aggregates, and (2) "muddying" of the surface water preceding infiltration. Pores through the surface soil are partially closed by breaking down the aggregates and clods, and deposits of fine particles from muddy surface water which infiltrates cause further reductions in the size of pores.

Some studies of aggregate breakdown were made at Coshocton. In these experiments four separate types of samples were analyzed. These included, (1) samples of surface soil preceding rainfall, (2) samples of soil carried by raindrop splash, (3) samples of soil carried by the runoff, and (4) samples of surface soil after rainfall and runoff had ceased. Each of the three latter samples contained higher percentages of small aggregates than did the surface soil preceding rainfall, and this was accepted as proof that the soil aggregate did break down under rainfall impact. How much of this breakdown was caused by the impact of the raindrops, and by the grinding process as the aggregates were being splashed about, and how much was caused by slacking remains an open question.

Since splash erosion causes so many damages such as soil loss above the channels and gullies, development of "spotty" soils, deterioration of soil structure, and reduction of infiltration, it is believed that measures of the rates of splash will have broad application to field problems. For presenting some of the practical aspects of such data, the principal factors affecting splash erosion in open fields will be divided into four primary groups: These include, (1) characteristics of the soil, (2) characteristics of soil covers such as growing crops and mulches, (3) characteristics of the slope, and (4) characteristics of the storm. A brief review of each is presented separately.

1. *Soil characteristics.* — Some soils are more stable under rainfall than others. The more stable soils do not suffer as much splash erosion as do the less stable ones. A measure of soil splash is important because the splash processes accelerate soil loss and other erosional damages, and they cause the surface to be "sealed" against infiltration. Splash erosion data on the different fields should be helpful in classifying soils according to their stability under rainfall. Or, to state the matter in other words, splash erosion data will be useful for identifying outstanding soil characteristics which are found in those soils most highly resistant to erosion. Such data should also have immediate application in making land-use plans. For example, a soil that suffers high rates of splash erosion should not be plowed clean as often as a more stable soil, one not so easily damaged by raindrops,

even though it be on lesser slope than the more stable soil. This has been recognized for sometime, but we have not known how much splash erosion occurred on the different fields. Eventually many of the soil characteristics which affect splash erosion may be evaluated, but pending completion of such research studies some useful data could probably be obtained by installing splash samplers on the different soils.

2. *Characteristics of soil covers.*—Leaves of cover crops and mulches which protect the soils against raindrop impact have a pronounced effect in preventing erosion. They do this primarily through preventing raindrop impact and splash on the soil surface. Splash interceptors set in different crops and where different residue disposal practices are employed would afford a means of evaluating these effects of the soil covers.

   Some cover crops may be even more effective than mulches which are composed only of the residues of plants grown on the area. Data relating to the effects of these different cover crops and mulches which reduce splash erosion should be of immediate use to those charged with responsibility for making land-use plans.

3. *Slope characteristics.*—While the gross slope of a hillside has an effect on raindrop erosion, it is believed its over-all effects can be modified considerably by tillage practices. Ridges, clods, and other surface irregularities will delay the formation of a connecting film of water which covers the entire soil surface. Since a connecting film of water increases raindrop erosion, any delay in its formation would curtail the splash erosion, especially for storms of low intensity or short duration. Samples of splash from fields where different tillage practices are used should be very helpful in evaluating effects of the surface conditions as developed and maintained by these practices.

4. *Storm characteristics.*—Since the variables of raindrop size and velocity have such great influence on erosion, it seems that development of methods for measuring size and velocity of raindrops will be of material aid in our studies of the effects of land-use practices on erosion and runoff. Such measurements should be particularly useful in comparing the effects of one storm with another.

In conclusion, it may be said that studies of splash erosion should not be considered as a substitute for measuring soil loss. Rather, it offers a means of making more detailed analysis of soil loss data. For example, large amounts of soil loss from a watershed may be caused by high rates of raindrop erosion, high rates of rill and gully erosion, or by both. Gully erosion causes more different types of damages than does raindrop erosion, and the corrective measures required to control a gully may be different from those required to control the raindrop splash. Splash erosion will cause topsoil to be displaced on the entire surface of a hillside, while flow in gullies and rills does not erode the soil surface outside these channels.

In addition to producing different types of erosion damages, each type of erosion will have different effects on the hydrology of the land. Gully erosion may have very little effect on infiltration outside the gullies, while splash erosion may seal the soil surface and retard infiltration rates on the entire field. Because of these and other reasons, I believe that studies of splash erosion will help in the analysis of much of the experimental watershed data we now have on hand or are now obtaining. If it does this, then it may be assumed that it will also be useful to those planning the land-use practices for soil and water conservation and for the control of floods.

Harvesting Seed of Barbados Sourgrass

By FRANKLIN M. GLOVER, JR.

Increased production of milk and meat to bolster the home food supply on the Island of St. Croix in the Virgin Islands group may result from the development by the Soil Conservation Service of equipment for harvesting seed of Barbados sourgrass, the most productive pasture grass on the island.

The grass is especially valuable as a pasture plant because of its ability to withstand extreme drought conditions which occur on the island virtually every year. Until recently, all propagation of this grass has been by stool planting, which is too expensive for general pasture improvement, and by natural spreading.

It was the general opinion of ranchers on the island that Barbados sourgrass could not be pro-

EDITOR'S NOTE.—The author is work group conservationist, Soil Conservation Service, Christiansted, St. Croix, Virgin Islands.

pagated by seed, but the Soil Conservation Service gathered a small amount of seed by hand labor to demonstrate propagation by this method. The demonstration plots were so successful, that a mechanical means of harvesting the seed was sought.

A combine or all-crop harvester was not adapted to harvesting this seed because of the long awns attached to the lemmas and the weight of the seed. An attachment for a mowing machine owned by the Service was finally designed and constructed, and is now being successfully used in harvesting the seed.

As of June 30, 1944, a total of 1,230 pounds of seed had been harvested from seed patches on cooperators' farms totaling 21.5 acres. At a seeding rate of 5 pounds per acre, this would plant 246 acres. Cost of harvesting the seed was 42 cents a pound. In each case the farmer was allotted enough seed to complete pasture improvement provided for under his cooperative agreement, and the remainder of the seed was reserved by the Service for planting on other farms.

The Service will use its own labor and equipment to establish a maximum 5-acre seed patch on any farm and agrees to harvest for the farmer enough seed from each patch to complete his pasture planting, with the farmer furnishing tractor fuel. Where the farmer agrees to do his own preparation and seeding, the Service will furnish seed for planting a maximum of 25 acres, and provide equipment for harvesting the seed as in the other instance.

MUSKRATS PAY FOR DIKE

Selective service for every acre means something on the W. C. Hinkle farm near Worland, Wyo. The seepy bottoms of the Big Horn River are not always suitable for cultivated crop production, but nevertheless can be turned into an economic asset when managed for wildlife crops. On the advice of Service technicians Mr. Hinkle put up an earth levee to stabilize the water level on a piece of marshy ground. Cattails and triangular rushes soon increased. Two years after the dike was constructed Mr. Hinkle was able to trap 75 muskrats on the few acres thus inundated.

BEAVERS BROUGHT BACK

Hay fields subirrigated by the waters of beaver ponds are becoming a more frequent sight in Wyoming. Streams which for many years had been barren of this wild animal engineer, and which as a consequence disappeared during dry spells and furiously discharged their silt-laden torrent during wet, now have returned to a condition approximating that which the first trappers found in Wyoming about 115 years ago. Lush meadows and stable streams are an asset obtained by the livestock producer by stocking beaver on his watercourses. The Wyoming Fish and Game Department and the Soil Conservation Service are helping farmers and ranchers in soil conservation districts to restore beavers to their old-time haunts.

REVIEWS

PRACTICAL FARMING FOR THE SOUTH, By Benjamin F. Bullock. The University of North Carolina Press, Chapel Hill, 1944. 510 pp. $2.50

The author believes that the production of an adequate and varied food supply is a fundamental problem of southern agriculture, and he is doing something about it. In this book he presents useful information on almost every aspect of ordinary crop production in the South. Starting with a brief discussion of types of soils and tillage, the first part of the book—on plant production—progresses through considerations of plant growth and reproduction, propagation, and improvement. Thus, a foundation is set upon which follows first a consideration of the home garden, with suggestions on what to grow and how to plant it, the tools needed, and the control of various insects and diseases. Then the home orchard is treated, naming varieties to grow, how to set out and fertilize the trees, the care of them, and the harvesting and storing of the fruit. There is a long chapter on field crops in which is discussed how to raise corn, wheat, alfalfa, cotton, peanuts, tobacco and many other crop plants. The farm woodlot gets a chapter, and another is devoted to a discussion of the rural home and its surroundings, with suggestions about how to handle water supply, sanitary conditions, electricity, and landscaping. Somewhat out of place at the end of this part of the book, but none the less valuable, is a brief section on the farm fishpond.

The second part —on animal production—starts with a chapter on feeding and care, followed by another on improving farm animals. There are chapters devoted to milk, pork, and poultry production, and one which describes the raising of honeybees. The final part of the book tells of farmers' cooperatives and types of credit available to small farmers. In conclusion, there is a replete list of books and government publications on a great variety of farming subjects. Preceding the index is a "Note on Plowing," added when the book was in press, which gives good statements of both the pros and cons of moldboard plowing, a subject at present much in the public eye.

The book is well named, for it is in fact a practical handbook, and, for all of its 510 pages, is easy to handle, being not more than an inch thick. It is well illustrated by carefully selected photographs. A good job of book making, it shows the care with which both author and publisher have gone into their subject. Some may say that there is little in the book not already available in state and federal publications, most of which are free or available at very small cost. Be that as it may, the author has chosen from all of them what he believes to be most useful to practicing farmers and has brought his choice neatly between the covers of a single volume.

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Compiled by William L. Robey, Printing & Distribution Unit

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DETROIT

(*Continued from page* 63)

Figure 66 looks to me to be up-side-down, but that isn't of too great consequence in a picture showing fire blight of pears. In view of the attention given to home gardens, beekeeping, farm fishponds and landscaping the home surroundings, it is surprising that attention was not given to the wildlife that farms can produce. Quail and doves, squirrels and cottontails, muskrats and opossums provide sport, food, and income for many farm families, and many acres of farm lands are most productively used when managed for yields of such wild creatures. The only mention of wildlife is an indefinite one in the legend to Figure 14, and recognition of the value of birds as insect eaters.

To the soil conservationist the book is of interest because of the effective way in which soil saving methods and practices are incorporated along with other considerations of good farming. For example, in the first chapter on soils and soil fertility, both text and illustrations give attention to rotation, cover crops, strip cropping, and other soil conservation measures thought to be essential to sound land use. Near the end of the book it is interesting to find that soil conservation is considered important as a means of protecting credit, and in support of soil conservation the author states that "the short time interest of the individual farmer must become synonymous with the long time interest of the nation as a whole."

Although works on agriculture are legion, the fact remains that, in this broad field, there are few general handbooks of practical value, such as this book appears to me to be. If I were a southern farmer I would have "Practical Farming for the South" within easy reach, and I think it would not be long before my copy would be worn and fingermarked from use.

Edward H. Graham

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